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An Empirical Analysis on Food Insecurity in Sri Lanka

N. P. Ravindra Deyshappriya[1]

Abstract

This study examines incidence of food insecurity in Sri Lanka along with its household determinants. The study found that 41.9% of Sri Lankan households are food insecure while 59% of households in Colombo district where the highest food insecurity is reported, are below the Minimum Dietary Energy Requirement (MDER). Food insecurity in urban sector is significantly higher than the rest of the country, as urban people mainly consume prepared and instant foods. The deep classification of food insecurity observed that 1.9% of households are extremely food insecure while 42.2% are vulnerable to food insecure. Furthermore, the impact of growth on reduction in food insecurity is significantly low, despite growth remarkably reduces poverty. The econometric analysis confirms that higher assets level, being a male-headed household, higher level of education, employed in government, semi-government sectors and being a self –employer and having agricultural lands significantly reduce the probabilities of falling into extremely and moderately food insecure. Therefore, the study recommends ensuring better employment opportunities, higher educational attainments along with safety nets for vulnerable groups such as female-headed households in order to achieve food security. Furthermore, urban-based food insecurity should be addressed by encouraging urban people to have energy rich staples rather than relying on prepared foods.

Keywords: calorie intake, economic growth, food insecurity, minimum dietary energy requirement, poverty
JEL Classifications: I12, F43, Q18, P28, I32

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1. Introduction

Healthy population is a blessing for nations as it directly increases labor productivity while cutting down the budget for health related issues. Healthiness of the population is mainly determined by the nutrition consumed by people and thus achieving food security is crucial for a healthy nation. Inability to ensure food security, so called "food insecurity" restricts the energy intake of people which adversely affects key economic variables at both micro and macro levels. According to Food and Agriculture Organization (1996) each and every country is facing number of issues related to food insecurity which costs 11% of GDP s, especially in Africa and Asia. Conversely, a dollar which is invested on any malnutrition prevention program, adds extra 16$ to economy in return on the investment (Food and Agriculture Organization, 1996, 2016). Therefore, addressing the issue of food insecurity and ensuring food security are vital at both national and global level. Thus, Sustainable Development Goals (SDGs) also incorporated this issue and the second goal of SDGs aims to end hunger by 2030 by ensuring food security and required nutrition levels. Food security is a broad concept which was defined as "food security exists when all people, at all times have physical, social and economic access to sufficient, safe and nutritious food, which meets their dietary needs and food preferences for an active and healthy life." (Food and Agriculture Organization, 1996).

As Kakwani and Son (2016) indicated, FAO definition of food security has four main dimensions such as food availability, access to food, food utilization and also stability and sustainability overtime. In contrast, an individual can be considered as food insecure, if the individual's food energy intake is below the nutritionally recommended threshold. This notion of food insecurity is in line with Food and Agriculture Organization (2009, 2012), Sibrian (2007), Mayadunne and Romeshun (2013) and Kakwani and Son (2016). Mayadunne and Romeshun (2013) further highlighted that individuals whose energy intakes are below the recommended threshold are considered as undernourished and in turn they are food insecure. Similarly, the ultimate measurable outcome of FAO's definition on food security is also intake of food energy, despite

FAO's definition is highly multidimensional. Apart from that, Sibrian (2007) highlighted that when the recommended calorie intake is satisfied, the minimum requirements of all other nutritional inputs such as protein and carbohydrate are also achieved. According to the Medical Research Institute (MRI) of Sri Lanka, the average per capita calorie allowance which needs to ensure a healthy life is 2030 kcal per day. Under this scenario, this study also relies on the same definition of food insecurity and nutritional anchor in order to examine food insecurity in Sri Lanka.

As of food insecurity in order to formulate appropriate policies towards food security. Studies such as Food and Agriculture Organization (2002), Wickramasinghe (2009) and Mayadunne and Romeshun (2013) have addressed the food insecurity in Sri Lanka and however each study has inbuilt weaknesses attached to methodologies and a developing country, it is crucial for Sri Lanka to investigate the prevalence selection of variables. Similarly, none of the mentioned studies have analyzed the determinants of food insecurity at household level. Therefore, the current study attempts to examine the food insecurity in Sri Lanka using Household Income and Expenditure Survey (HIES) data in 2012/13 survey years. The study includes five specific objectives.

- Calculate the share of food insecure population at national, sectoral and district levels
- Identify the share of population who are vulnerable to food insecurity at national, sectoral and district levels.
- Formulate a deeper classification of food insecurity in order to recognize the households who are extremely food insecure and vulnerable to food insecure.
- Examine the link between poverty and food insecurity in Sri Lanka.
- Examine the household determinants of food insecurity in Sri Lanka.

The main contribution of this paper includes enriching the literature by examining multifaceted nature of food insecurity at household level highlighting the share of households who are extremely food insecure and vulnerable to food insecure. In fact, broader classification of food insecurity as 'Food Insecure' and

'Food Secure' ignores the households who are vulnerable to food insecurity, as they are counted as food secure households.

However, this category of households need special attention as they might fall back into food insecure due to any shock at micro or macro levels. Similarly, the households who are extremely food insecure should also be prioritized as they are vulnerable to critical health conditions and nutrition related diseases. Apart from that, it is observed that impact of growth on food (in)security is not even across geographical locations. Therefore, the current study also analyzes the impact of growth on reduction of food insecurity in Sri Lanka at district level using Growth Elasticity of Food Insecurity. The next sections of the paper elaborates the literature, methodology and results and discussion followed by conclusions and recommendation towards better food policy in Sri Lanka.

2. Brief Review on Existing Knowledge on Food (In)Security

Food insecurity is multifaceted itself and its consequences are also multidimensional (Abafita & Kim, 2014). In 1974, the World Food Conference held in Rome highlighted the issues of global food insecurity for the first time and thereafter, a growing discussion on food insecurity at global, regional and national levels has been arisen. (Maxwel, 1996, Napoli, De-Muro, & Mazziotta, 2011). According to Food and Agriculture Organization (1996), food insecurity has four main dimensions: *availability, utilization, stability and sustainability*. Webb *et al.* (2006) highlighted that it is difficult to find a precise measure for food insecurity due to this multifaceted nature of food insecurity.

However, Maxwell, Caldwell, and Langworthy (2008) summarized the commonly used measure such as households' expenditure on foods, nutritional status, actual household food consumption level, dietary requirement and diversity and household food insecurity access scale. Most of the empirical analyses which used these measurements have ended up with mixed findings. An analysis of food insecurity in Pakistan by Sultana and Kiani (2011) concluded that educational attainments beyond intermediate level reduce food insecurity while dependency ratio increases the level of food insecurity at household level. Moreover, they confirmed that

both social capital and status of employment have no significant impact on food insecurity in Pakistan. Kidane, Alemu, and Kundhlande (2005) and Rose, Gundersen, and Oliveira (1998) have also stressed the importance of education on food security in Ethiopia and USA respectively.

More specifically, Kidane et al. (2005) has highlighted that even the primary level education significantly improves food insecurity while ensuring higher income for households. Apart from that, size of households and dependency ratio are also found to be positively related with food insecurity. Ramakrisha and Demeke (2002), and Amaza, Umeh Joseph, Helsen, and Adejobi (2006) observed that family size and dependency ratio increase food insecurity in Ethiopia and Nigeria respectively. Social Safety Net Programs (SSNP) such as food stamps, elderly and disability allowances are much common in most of developing countries especially in order to reduce poverty. However, Subbarao, Braithwaite, and Carvalko (1997) found that these kinds of SSNPs reduce not only poverty, but food insecurity as well. In addition to SSNPs, accumulated assets of households also play a crucial role in reducing food insecurity. According to Demeke, Keil, and Zeller (2011), assets and resource endowment of households depend on human capital, physical capital, financial capital, natural capital and social capital as well. Therefore, accumulated assets or resource endowment apparently reduces the level of food insecurity (Demeke *et al.,* 2011). Particularly, Putnam (1995) elaborated the linkages between social capital and food insecurity by considering social connections. As Putnam (1995) highlighted that social connections reduce the probability of being food insecure, since social connections allow sharing staples and better nutritious habits among households.

Apart from these international studies, empirical analyses focus on food insecurity in Sri Lanka is relatively low. Studies by Wickramasinghe (2008), De Silva (2007), Nanayakkara and Premathilake (1987), Nanayakkara (1994) and Mayadunne and Romeshun (2013) have computed incidence of food insecurity of Sri Lanka at national and district levels. However, none of these studies have examined the determinants of food insecurity in Sri Lanka.

Apart from that, these empirical works have not attempted to recognize extremely food insecure households and the households who are vulnerable to food insecure. Consequently, re-examining the status of food insecurity along with recognizing the factors of food insecurity is timely important to formulate effective policies toward food security.

3. Methodology

3.1. Data and Measuring Food Insecurity

The current study is based on the data from Household Income and Expenditure Survey (HIES) which was conducted by the Department of Census and Statistics of Sri Lanka in 2012/2013, covering approximately 20,540 households. The HIES is the most comprehensive data set available in Sri Lanka at household level and it enriches with demographic, income, expenditure and other key social-economic information. Particularly, food consumption information was collected for one week of reference period and the information contains quantity of each food consumed by households. In line with the definition of Food and Agriculture Organization (2009, 2012), Sibrian (2007), Mayadunne and Romeshun (2013) and Kakwani and Son (2016), individuals whose per capita daily calorie consumption is below 2030 kcal are considered as food insecure individuals.

In addition to two-way classification of food security (Food Secure and Food Insecure), this study classified households into four categories in order to identify the household who are extremely food insecure and vulnerable to food insecure. Households were classified into four categories based on the following criteria.

Extreme Food Insecure: The households' whose daily Calorie Consumption (CC) is less than or equal to half of the Recommended Calorie Consumption (RCC).

(HH's CC$\leq 0.5(RCC)$)

Moderately Food Insecure: The households' whose daily CC lies between half of the RCC and the RCC.

($0.5(RCC) <$HH's CC$\leq RCC$)

Vulnerable to Food Insecure: The households' whose daily CC lies between the RCC and 1.5 times the RCC.

$$(\text{RCC} < \text{HH's CC} \leq 1.5(RCC))$$

Food Secure: The households' whose daily CC is higher than 1.5 times the RCC.

$$(\text{HH's CC} > 1.5(RCC))$$

3.2. Analytical Techniques

This study enriches with both descriptive and econometric analyses in order to accomplish the objectives of the research. Descriptive analysis mainly focuses on calculation and presentation of food insecurity at national, sectoral and district levels. In line with Kakwani and Son (2016), descriptive analysis also includes Growth Elasticity of Food Insecurity (GEFIS) which quantifies the change in food insecurity due to 1% change in per capita income.

$$GEFIS = \frac{Percentage\ Change\ in\ Food\ Insecurity}{Percentage\ Change\ in\ Per\ capita\ Income}$$

Apart from the descriptive analysis, an econometric analysis which based on Ordered Probit Model was employed to model household determinants of food insecurity. Further, the Ordered Probit Model allows to examine a selected household's probability of falling into each type of food insecurity. Particularly, examination of the probability of falling into "vulnerable to food insecurity" has not been empirically researched in the literature. The general format of the Ordered Probit Model can be expressed as follows.

$$y_i^* = x_i\beta + u_i \quad \text{.....} \quad \mathbf{1}$$

Where y^* is a discrete variable which can take any value 1- 4 which indicates the different levels of food insecurity as indicated in the section 3.1.

$y = 1\ for\ Extremely\ Food\ Insecure\ Households$
$y = 2\ for\ Moderately\ Food\ Insecure\ Households$
$y = 3\ for\ Households\ whoe\ are\ Vulnerable\ to\ \ Food\ Insecurity$
$y = 4\ for\ Food\ Secure\ Households$

Furthermore, *"x"* is in equation (1) represents the vector of explanatory variables. The variables includes household size, assets

index, sector of living (Urban, Rural or Estate), sex of head of household (Male or Female), levels of education (No Schooling, Primary, Secondary, Tertiary, Degree or above), employment status (Unemployed, Government sector, Semi-government, Private sector, Employer, Self-employed and Family worker) and having agricultural lands.

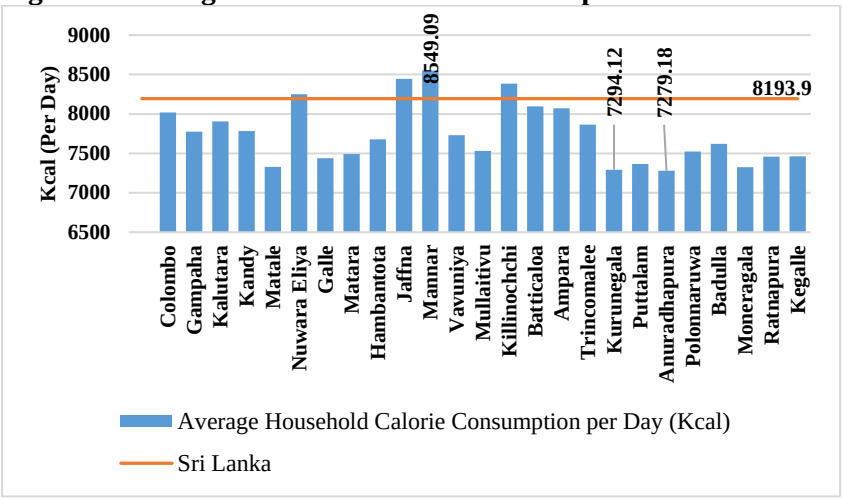
4. Results and Discussion

4.1. Food Insecurity at District and Sectoral Levels

This section elaborates the main findings of both descriptive and econometric analysis. Firstly, results of the descriptive analysis are discussed followed by the econometric analysis. Initially, it is important to examine the households' average calorie consumption at district level in order to identify the disparities in calorie consumption at district level. According to Figure 1, average national households' calorie consumption of ffna, Killinochchi and Nuwara Eliya have exceeded the national calorie consumptionSri Lanka is 8193.9 Kcal per day and only four districts – Mannar, Ja. Particularly, Mannar reported the highest calorie consumption amongst all districts and a household in Mannar consumes 8549.09 Kcal per day on average. In contrast, Anuradhapura (7279.18) and Kurunegala (7294.12) districts reported the lowest calorie consumption those are significantly lower than the national average.

Interestingly, most of the districts which exceeded the national calorie consumption (Killinochchi, Jaffna, Mannar), are war affected areas where the household incomes are lower than the rest of the districts. Conversely, average households' calorie consumptions of major economic centers such as Colombo, Gampaha, Kalutara, Galle and Kandy are considerably lower than the national average. Thus, this notion provides an indication that calorie consumption has no exact link with household income.

Figure 1: Average Household Calorie Consumption at District Level



Source: Author based on HIES (2012/13)

Table 1 summarizes the district level statistics related to food insecurity in Sri Lanka. According to Table 1, 43.3% of people and 41.9% households of Sri Lanka were suffering from food insecurity during 2012/13, as they were unable to meet Minimum Dietary Energy Requirement (MDER). Colombo district – the key economic center of Sri Lanka accommodates the largest shares of food insecurity people (56.2%) and households (59.0%).

Moreover, food insecurity in all three districts in the Western Province – Colombo, Gampaha and Kalutara, is significantly higher than that of national average. In fact, Mayadunne and Romeshun (2013) have also found the similar food insecurity incidence even in 2006/07 and 2009/10 in the Western Province, especially in Colombo district.

The second largest food insecure share of population are in Mullaitivu where 55.2% of population and 50.8% of households are unable to meet the MDER. In contrast, Polonnaruwa where only 27.5% of population and 34.1% of households are unable to acquire MDER, reports the lowest food insecurity in Sri Lanka followed by Matale. However, Nuwara Eliya district has the lowest share of food insecure households (23.8%) followed by Badulla (28.1%) during the survey period of 2012/13.

Table 1: District Level Food Insecurity in Sri Lanka

Districts	% of food insecure People	Number of food insecure People	% of food insecure Households	Number of Food Insecure Households
Sri Lanka	43.3	9087960	41.9	2146092
Colombo	56.2	1283211	59.0	327069
Gampaha	49.0	1139689	49.3	282435
Kalutara	46.5	581207	47.1	141085
Kandy	39.0	570366	41.4	139947
Matale	29.0	151542	33.6	42624
Nuwara Eliya	36.8	290955	23.8	39961
Galle	40.5	446112	46.0	126473
Matara	36.4	312821	37.5	78577
Hambantota	33.7	213564	30.5	46373
Jaffna	47.2	280879	37.6	51723
Mannar	44.7	45431	58.7	13411
Vavuniya	40.3	72968	37.0	15913
Mullaitivu	55.2	50052	50.8	12231
Kilinochchi	45.8	51960	36.4	9855
Batticaloa	43.6	238873	52.0	66629
Ampara	42.8	285792	41.6	65829
Tricomalee	34.9	132552	43.0	40799
Kurunegala	42.2	711449	38.4	164223
Puttalam	33.8	272606	38.4	78118
Anuradhapura	33.5	280419	35.7	80604
Polonnaruwa	27.5	117310	34.1	35116
Badulla	38.6	327180	28.1	57995
Monaragala	35.9	164667	35.4	42063
Ratnapura	52.6	590550	33.2	95421
Kegalle	53.3	475805	42.3	91618

Source: Author based on HIES (2012/13)

Apart from the district level food insecurity analysis, Table 2 indicates the sectoral nature of food insecurity in Sri Lanka. In line with district level analysis, urban sector of Sri Lanka accounts for the largest share of food insecure people and households as well. More specifically, 48.4% of urban population and 55.6% of urban households are food insecure while only 40% and 30% respectively in estate sector.

Therefore, it is apparent that rate of food insecurity is considerably higher in urban sector compared to other sectors and national level as well.

Table 2: Sectoral Food Insecurity in Sri Lanka

Districts	% of food insecure People	Number of food insecure People	% of food insecure Households	Number of Food Insecure Households
Sri Lanka	43.3	9087959	41.9	2146092
Urban	48.4	1791610	55.6	489376
Rural	42.4	6885399	39.6	1591566
Estate	40	410950	30	65150

Source: Author based on HIES (2012/13)

High food insecurity in urban sector and urbanized districts such as Colombo, Gampaha and Kalutara is mainly due to lack of expenses on food items compared to non-food items. Specially, non-food expenses for housing, transportation, health and education in urbanized districts are drastically higher than rural and estate sectors.

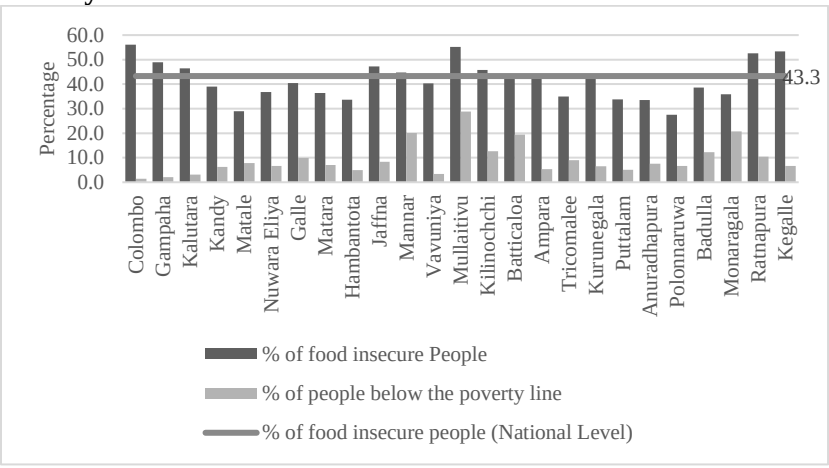
In turn, the households in the urbanized districts allocate large share of their expenditure on non-food items rather than food items. Apart from that, they have a habit of spending largely on prepared and instant foods due to extended working hours, while the consumption of energy yielding staples such as rice, rice products, wheat flour and yams are significantly low. In contrast, people in agriculture based rural and plantation based estate sectors largely spend on energy yielding staples and therefore people in rural and estate sectors have higher possibility of achieving MDER compared to urban sector.

4.2. Food Insecurity, Poverty and Economic Growth

This section examines whether there is an exact pattern between food insecurity and poverty in Sri Lanka. Figure 2 illustrates share of food insecure population and poverty headcount index at district level along with average rate of food insecurity at national level. It is apparent that there is no clear link between share of food insecurity and poverty rate in Sri Lanka. However, districts such as Colombo, Gampaha and Kalurata where the poverty rates are substantially low, have reported striking rates of food insecurity, even higher than national average.

In contrast, Badulla and Monaragala have moderately low food insecurity, despite having significantly higher poverty rates. Apart from that, some War affected districts such as Mullaitivu, Killinochchi and Batticaloa have both higher poverty and food insecure rates.

Figure 2: Share of Food Insecure People and Poverty Headcount Index by District



Source: Author based on HIES (2012/13)

In fact, the people who live in Colombo, Gampaha and Kalutara districts and other districts with low level of poverty spend less on food items and allocates large share of their expenditure for purchasing non-food items. Similarly, they spend drastically low expenditure on energy yielding staples such as rice, rice products and wheat flour and yam, while spending large share of their food expenditure on prepared and instant foods. Therefore, majority of the population in these districts are behind MDER. Nevertheless, higher total expenditure which is driven by larger non-food expenditure, allows most of households to exceed the poverty threshold of expenditure.

Therefore, poverty incidence in these districts are significantly lower than that of other districts. Conversely, people in districts such as Badulla and Monaragala where rural and estate sectors are relatively larger, mainly spend on energy yielding staples while expenses on prepared foods are negligible. Thus, MDER can

be easily met and in turn food security is ensured. However, total expenditure of most of the households in these districts are below the poverty line, due to reduced non-food expenditure. Consequently, poverty rates are higher in such districts compared to Colombo, Gampaha and Kalutara.

In addition to that, adverse impacts of the War is the key factor of severe food insecurity and higher poverty rates in Mullaitivu, Killinochchi and Batticaloa. Therefore, in line with Mayadunne and Romeshun (2013), Lele (2015) and Kakwani and Son (2016), this study also confirms that there is no well-established link between poverty and food insecurity.

According to Kakwani and Son (2016), reduction in food insecurity is considerably lower than that of poverty. In fact, economic growth ensures higher income level which leads to lower the poverty rates immediately. However, unlike poverty rates, calories intake which measures food insecurity increase very slowly with economic growth. Therefore, higher economic growth does not guarantee lower level of food insecurity (Kakwani & Son, 2016).

This study calculates the Growth Elasticity of Poverty (GEP) and Growth Elasticity of Food Insecurity (GEFI) for Sri Lanka during period of 2007-2013, in order to revisit the notion highlighted by Kakwani & Son (2016). As Table 3 indicates, 1% increase in economic growth rate reduces poverty incidence by 0.65% and increases food insecurity by 0.50% at national level. The coefficient for GEFI is positive due to increasing pattern of food insecurity at national level during the period of 2007-2013. However, GEP is negative at national level and for all districts, except Batticaloa (3.98). It implies that economic growth of Sri Lanka reduces poverty incidence in all the districts, except Batticaloa.

In contrast, economic growth declines food insecurity only in 7 districts (Gampaha, Matale, Galle, Matara, Puttalam, Anuradhapura and Polonnaruwa) while showing an increasing pattern for other districts. Consequently, most of the districts have higher rate of food insecurity, despite the poverty incidences are significantly low. Hence, it is apparent that, though the growth

substantially contributes poverty reduction, food insecurity is only marginally benefitted from the economic growth.

Table 3: Impact of Growth in Reducing Food Insecurity and Poverty

Districts	Growth Rate of Per Capita Income (2007-2013)	Change in Food Insecurity (%) (2007-2013)	Change in Poverty (%) (2007-2013)	Growth Elasticity of Poverty	Growth Elasticity of Food Insecurity
Sri Lanka	82.9	41.3	-55.9	-0.67	0.50
Colombo	90.3	2.1	-74.1	-0.82	0.02
Gampaha	110.0	-26.6	-75.9	-0.69	-0.24
Kalutara	88.9	18.9	-76.2	-0.86	0.21
Kandy	83.9	42.1	-63.5	-0.76	0.50
Matale	85.3	-65.4	-58.7	-0.69	-0.77
Nuwara Eliya	44.5	132.1	-80.5	-1.81	2.97
Galle	73.6	-31.3	-27.7	-0.38	-0.43
Matara	99.4	-38.9	-51.7	-0.52	-0.39
Hambantota	104.2	33.1	-61.4	-0.59	0.32
Batticaloa	20.4	67.8	81.3	3.98	3.32
Ampara	69.1	91.5	-50.5	-0.73	1.32
Kurunegala	98.6	30.8	-57.8	-0.59	0.31
Puttalam	104.2	-42.4	-61.1	-0.59	-0.41
Anuradhapura	63.6	-13.7	-49.0	-0.77	-0.22
Polonnaruwa	29.8	-49.9	-47.2	-1.59	-1.68
Badulla	72.6	45.4	-48.1	-0.66	0.63
Moneragala	94.5	56.6	-37.3	-0.40	0.60
Ratnapura	101.5	120.8	-60.9	-0.60	1.19
Kegalle	118.9	41.7	-68.1	-0.57	0.35

Source: Author based on HIES (2012/13)

4.3. Deeper Classification of Food Insecurity in Sri Lanka

The classification stated above provides only a broad understanding about households' food insecurity status in Sri Lanka. However, classifying households as 'food insecure' and 'food secure' ignores the intensity of food insecurity and inequality in food insecurity of two categories of households (food insecure and food secure). As a result, both extremely food insecure and moderately food insecure households are commonly considered as 'food insecure' while both vulnerable to food insecure and food secure households are categorized as 'food secure'. However, both extremely food insecure and vulnerable to food insecure households should be

received special attention in policy making and so that it is crucial to recognize the mentioned two groups. Hence, the current study identified four types of households in terms of food insecurity based on the methods indicated in section 3.2. Table 4 summarizes the share of households falls into each category of food insecurity.

According to national level estimation, only 14.5% of households are recognized as food secure while 1.9%, 41.4% and 42.2% of households are categorized as extremely food insecure, moderately food insecure and vulnerable to food insecure respectively. Rathnapura (3.9%), Kegalle (3.7%), Jaffna (3.6%) and Colombo (3.1%) districts account for the largest share of extremely food insecure households while Mullaitivu (53.3%), Gampaha (53%), Kegalle (49.8%) and Rathnapura (48.7%) districts accommodate the largest share of moderately food insecure households.

Households who are vulnerable to food insecure are just above the MDER and hence, they might fall below the MDER due to any shock at micro or macro levels. According to Table 4, households who are vulnerable to food insecurity are higher in the districts such as Matale (51.3%), Puttalam (51.2%) and Polonnaruwa (50.7%). In contrast, Kegalle (28.2%) has reported the lowest households who are vulnerable to food insecure. According to MDER, Colombo (7.9%) accounts for the lowest share of food secure households followed by Gampaha (10.5%). Conversely, 21.9% of households in Polonnaruwa have achieved MDER, reporting the highest food security followed by Monaragala (20.0%). In general, majority of households at national and district levels are vulnerable to food insecure and thus there is a potential risk of falling them into 'food insecure' category due to any economic shock. Similarly, extremely food insecure households also require special attention as they are unable to achieve at least half of MDER.

Table 4: Deeper Classification of Food Insecurity by District

Districts	Extremely Food Insecure (% of Households)	Moderately Food Insecure (% of Households)	Vulnerable to Food Insecure (% of Households)	Food Secure (% of Households)
Sri Lanka	1.90	41.40	42.20	14.50
Colombo	3.10	53.00	35.90	7.90
Gampaha	1.60	47.40	40.50	10.50
Kalutara	2.30	44.10	40.60	12.90
Kandy	0.90	38.10	44.90	16.00
Matale	0.60	28.40	51.30	19.70
Nuwara Eliya	0.50	36.30	44.20	19.00
Galle	1.10	39.40	43.70	15.80
Matara	2.00	34.40	45.10	18.50
Hambantota	0.60	33.10	49.40	16.90
Jaffna	3.60	43.60	37.60	15.10
Mannar	0.00	44.70	43.10	12.20
Vavuniya	2.00	38.30	44.40	15.40
Mullaitivu	1.90	53.30	32.00	12.70
Kilinochchi	2.20	43.60	39.30	15.00
Batticaloa	1.20	42.40	42.80	13.50
Ampara	1.00	41.80	42.80	14.40
Tricomalee	0.80	34.10	48.70	16.40
Kurunegala	1.60	40.60	43.70	14.20
Puttalam	1.60	32.10	51.20	15.10
Anuradhapura	1.60	32.00	48.90	17.50
Polonnaruwa	1.40	26.10	50.70	21.90
Badulla	1.70	36.90	46.80	14.60
Monaragala	0.80	35.00	44.20	20.00
Ratnapura	3.90	48.70	33.60	13.80
Kegalle	3.70	49.80	28.20	18.40

Source: Author based on HIES (2012/13)

4.4. Household Determinants of Food Insecurity in Sri Lanka

It is a well-known fact that food insecurity is a function of both micro and macroeconomic factors. However, combining micro level household characteristics with macro level data is extremely difficult in empirical analysis. Therefore, this section examines only the impact of households' determinants on food insecurity using household level data. Table 5 summarizes the marginal effects (in percentage) related to each household determinant along with their level of significance.

Despite size of household is not a significant factor of food insecurity in Sri Lanka, the impact of level of assets on food

insecurity is significant at 1% level. More spe Despite size of household is not a significant factor of food insecurity in Sri Lanka, the impact of level of assets on food insecurity is significant at 1% level. Significantly, 1% increase in asset index reduces the probability of being extremely food insecure, moderately food insecure by 0.025% and 0.201% respectively. Asset index is a composite index which accounts for all household level assets including domestic equipment, electronic appliance and agricultural equipment as well. Further, similar result has been found by Abafita and Kim (2014) in the context of Ethiopia. Thus, the asset index is an important proxy for households' wealth which significantly influences on food security.

Apart from that, male-headed households are more food secure than that of female-headed. According to Table 5, male-headed households have 0.69% of higher probability of falling into food secure category compared to female-headed households. Similarly, the probabilities of falling into extremely food insecure and moderately food insecure of male-headed households are also lower by 0.13% and 1.05% compared to female-headed households. In fact, male-headed households have better access to nutritious food as their income levels are higher than that of female-headed. It is apparent that higher educational attainments seem to be the most crucial household factor of ensuring food security.

In general, all education levels reduce the probability of being extremely and moderately food insecure while increasing the probability of being food secure compared to no schooling category. However, only the education levels such as secondary, tertiary and degree and above show statistically significant relationship with each type of food insecurity. Empirical works by Sultana and Kiani (2011), Kidane, Alemu, and Kundhlande (2005) and Rose et al. (1998) have also found similar impact of education on food insecurity in the context of Pakistan, Ethiopia and USA respectively.

Table 5: Results of Ordered Probit Model

Variables	Coefficients	Robust Standad Error	Marginal Effects (%)			
			Extremely Food Insecure	Moderately Food Insecure	Vulnerable to Food Insecure	Food Secure
HH Size	0.0008	0.0049	-0.0033	-0.0271	0.0126	0.0178
Assets Index	0.0057***	0.0015	-0.025***	-0.201***	0.0931***	0.1318***
Sector (Estate)						
Estate	0.0208	0.0334	-0.0860	-0.7278	0.3317	0.4821
Rural	0.0101	0.0189	-0.0429	-0.3557	0.1654	0.2332
Gender (Female)						
Male	0.0346**	0.0153	-0.1261**	-1.0470**	0.4854**	0.6877**
Education (No Schooling)						
Primary	0.0135	0.0401	-0.0564	-0.4723	0.2174	0.3113
Secondary	-0.0721*	0.0393	-0.3015*	-2.5237*	1.1603*	1.6649*
Tertiary	-0.1007**	0.0454	-0.459**	-3.5146**	1.7465**	2.2275**
Degree or <	-0.1077*	0.0650	-0.5058	-3.7493*	1.9115	2.3437*
Employment (Unemployed)						
Government	0.0994**	0.0346	-0.383**	-3.4812**	1.4758**	2.3885**
Semi Gov.	0.1109**	0.0469	-0.419**	-3.8811**	1.6115**	2.6890**
Private	-0.0060	0.0219	0.0252	0.2091	-0.0972	-0.1372
Employer	0.0544	0.0567	-0.2171	-1.9067	0.8379	1.2859
Self-Employ	0.0633*	0.0226	-0.259**	-2.2166**	0.9962**	1.4788**
Fam. Work	-0.0750	0.1581	0.3423	2.6178	-1.3025	-1.6576
Agri Land (No Agri Land)						
Have Agri L.	0.0415*	0.0222	-0.1797*	-1.4499*	0.6896*	0.9401*
Ancillary parameters			**Marginal Effects after Ordered Probit**			
/cut1	-1.6159	0.1379	0.0012`	0.0436	0.1561	0.7989
/cut2	0.3207	0.1367				
/cut3	1.5539	0.1371				
Prob > chi^2	0.0000					
Pseudo R^2	0.0019					
Observations	20539					

Source: Author based on HIES (2012/13)

Despite that Sultana and Kiani (2011) haven't found any relationship between employment status and food in(security), the current study found that both government and semi-government employees and self-employed people tend to be more food secure compared to unemployed people. Particularly, the probabilities of being extremely and moderately food insecure of the households who are employed in government sector are lower by 0.38% and 3.48% respectively, compared to unemployed households. The impact of employing in semi-government sector are also similar to that of government sector. However, the probabilities of being extremely and moderately food insecure of self-employed people are lower by 0.26% and 2.22% compared to unemployed households.

Similarly, the probability of falling into food secure category of self-employed people is higher by 1.48% compared to unemployed households. In fact, higher educational attainment is the driving factor of better food habits and also better employment opportunities. Consequently, both higher level of education and better employment opportunities ensure food security while reducing the risk of falling into categories of extremely and moderately food insecure. As Table 05 indicates, having agricultural lands also significantly affect reducing food insecurity. Extended rural economy of Sri Lanka mainly depends on agriculture and hence owning agricultural lands ensure availability of staple foods, particularly such as rice for households' consumption.

Consequently, the probabilities of being extremely and moderately food insecure of the households with agriculture lands are lower by 0.18% and 1.45%, compared to the households have no agriculture lands. Studies such as Gebre-Selassie (2005) and Madeley (2000) have also confirmed that holding agricultural lands and livestock essentially reduce food insecurity. Considering overall significance of the model, the estimated ordered probit model is significant at 1% (Prob. > chi^2 (0.000)) level. Hence, it is apparent that the estimated model is statistically appropriate to examine the link between household factors and food insecurity in Sri Lanka.

5. Conclusion and Recommendations

According to FAO, food security exists when all people, at all times have physical, social and economic access to sufficient, safe and nutritious food, which meets their dietary needs and food preferences for an active and healthy life. Therefore, it is apparent that food (in)security is a multifaceted concept as it based on dimensions such as food availability, access to food, food utilization and also stability and sustainability overtime. However, an individual can be considered as food insecure, if the individual's food energy intake is below the nutritionally recommended threshold, so called MDER. This study utilized HIES (2012/13) data and computed MDER to recognize food insecurity households in Sri Lanka followed by an econometric analysis to examine the household determinants of food insecurity. The analysis indicates that 41.9% of households in Sri Lanka are suffering from food

insecurity while largest share of food insecure households are located in Colombo, Gampaha and Kalutara districts. In contrast, Nuwara Eliya and Badulla accounts for the lowest food insecurity rate.

High food insecurity in urban sector and urbanized districts such as Colombo, Gampaha and Kalutara is mainly due to two reasons. Firstly, their expenses on food items are relatively low compared to the share of non-food expenditure such as house rent, education and other utility bills. Secondly, they have a habit of spending largely on prepared and instant foods due to extended working hours, while the consumption of energy yielding staples are dramatically low. In addition to two-way classification on food insecurity, the current study classified households into four categories in order to identify extremely food insecure households and the households who are vulnerable to food insecure. The four-way classification indicates that only 14.5% of households are food secure at national level while 1.9%, 41.4% and 42.2% of households are recognized as extremely food insecure, moderately food insecure and vulnerable to food insecure respectively. Districts such as Rathnapura (3.9%), Kegalle (3.7%) and Jaffna (3.6%) account for the largest share of extremely food insecure households while Matale (51.3%), Puttalam (51.2%) and Polonnaruwa (50.7%) accommodate the largest share of the households who are vulnerable to food insecure.

Furthermore, this study confirms that there is no clear link between poverty and food insecurity in the context of Sri Lanka and in turn breaks the pre-assumption that implies poverty causes food insecurity. However, it is observed that economic growth reduces poverty rates immediately through increasing household income, despite calories intake which measures food insecurity increase very slowly with economic growth. Therefore, higher economic growth does not guarantee a rapid reduction in food insecurity. The econometric analysis emphasizes that better employment opportunities and higher education attainments are the key household determinants that reduce households' food insecurity in Sri Lanka. Apart from that, level of asset, type of the head of household and ownership of agricultural lands also significantly

determine the level of food insecurity. In conclusion, considerable food insecurity in urban areas is mainly due to food habits created by hectic working environment. Therefore, it is important to improve their awareness on food security and encourage them to shift from current food habit to more healthy nourishments. Similarly, the study recommends providing food transfers to vulnerable groups such as female-headed households as they are left behind compared to the rest in society. Apart from that, ensuring better employment opportunities and education attainments which lead to increase household income are also crucial to lessen food insecurity in Sri Lanka.

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Annexure

Table A1: Deeper Classification of Food Insecurity by Sectors

		Sectors	Extremely Food Insecure	Food Secure
Sri Lanka	1.9	41.4	42.2	14.5
Urban	2.3	46.1	39.8	11.9
Rural	1.8	40.6	42.8	14.8
Estate	1.6	38.4	41.9	18.1

Table A2: Deeper Classification of Food Insecurity by Employment Status

Employment Status	Extremely Food Insecure	Food Insecure	Vulnerable to Food Insecure	Food Secure
Government Sector	2.0	40.8	43.5	13.7
Semi-Government	1.7	41.6	43.0	13.7
Private Sector	1.9	42.4	41.5	14.2
Employer	2.1	41.9	41.1	14.9
Own Accounting Worker	1.9	40.4	42.8	14.9
Contributing Family Worker	1.6	40.9	43.1	14.5
Unemployed	2.0	40.3	42.1	15.5
National Average	1.9	41.7	42.0	14.4

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